

## IN THE CLAIMS

CLAIM 1 (Previously Presented) A superconducting apparatus comprising a composition having a transition temperature greater than 26°K, the composition including a rare earth or near rare earth-like element, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature in excess of 26°K, a means for maintaining said composition at said temperature to exhibit said superconductivity and means for passing an electrical superconducting current through said composition while exhibiting said superconductivity.

CLAIM 2 (Previously Presented) The superconducting apparatus of claim 1, further including an alkaline earth element substituted for at least one atom of said rare earth or rare earth-like element in said composition.

CLAIM 3 (Previously Presented) The superconducting apparatus of claim 2, where said transition metal is Cu.

CLAIM 4 (Previously Presented) The superconducting apparatus of claim 3, where said alkaline earth element is selected from the group consisting of B, Ca, Ba, and Sr.

CLAIM 5 (Previously Presented) The superconducting apparatus of claim 1, where said transition metal element is selected from the group consisting of Cu, Ni, and Cr.

CLAIM 6 (Previously Presented) The superconducting apparatus of claim 2, where said rare earth or rare earth-like element is selected from the group consisting of La, Nd, and Ce.

CLAIM 7 (Previously Presented) The superconducting apparatus of claim 1, where said phase is crystalline with a perovskite-like structure.

CLAIM 8 (Previously Presented) The superconducting apparatus of claim 2, where said phase is crystalline with a perovskite-like structure.

CLAIM 9 (Previously Presented) The superconducting apparatus of claim 1, where said phase exhibits a layer-like crystalline structure.

CLAIM 10 (Previously Presented) The superconducting apparatus of claim 1, where said phase is a mixed copper oxide phase.

CLAIM 11 (Previously Presented) The superconducting apparatus of claim 1, where said composition is comprised of mixed oxides with alkaline earth doping.

CLAIM 12 (Previously Presented) A superconducting combination, including a superconductive composition having a transition temperature  $> 26^{\circ}\text{K}$ ,

means for passing a superconducting electrical current through said composition while said composition is at a temperature  $> 26^{\circ}\text{K}$  and less than said transition temperature, and

cooling means for cooling said composition to a superconducting state at a temperature in excess of  $26^{\circ}\text{K}$ .

CLAIM 13 (Original) The combination of claim 12, where said superconductive composition includes a transition metal oxide.

CLAIM 14 (Original) The combination of claim 12, where said superconductive composition includes Cu-oxide.

CLAIM 15 (Original) The combination of claim 12, where said superconductive composition includes a multivalent transition metal, oxygen, and at least one additional element.

CLAIM 16 (Original) The combination of claim 15, where said transition metal is Cu.

CLAIM 17 (Original) The combination of claim 15, where said additional element is a rare earth or rare earth-like element.

CLAIM 18 (Original) The combination of claim 15, where said additional element is an alkaline earth element.

CLAIM 19 (Original) The combination of claim 12, where said composition includes a perovskite-like superconducting phase.

CLAIM 20 (Original) The combination of claim 12, where said composition includes a substituted transition metal oxide.

CLAIM 21 (Original) The combination of claim 20, where said substituted transition metal oxide includes a multivalent transition metal element.

CLAIM 22 (Original) The combination of claim 20, where said substituted transition metal oxide is an oxide of copper.

CLAIM 23 (Original) The combination of claim 20, where said substituted transition metal oxide has a layer-like structure.

CLAIM 24 (Previously Presented) An apparatus comprising:

a transition metal oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K,

means for lowering the temperature of said material at least to said critical temperature to produce said superconducting state in said phase, and

means for passing an electrical superconducting current through said transition metal oxide while it is in said superconducting state.

CLAIM 25 (Previously Presented) The apparatus of claim 24, where said transition metal oxide is comprised of a transition metal capable of exhibiting multivalent states.

CLAIM 26 (Previously Presented) The apparatus of claim 24, where said transition metal oxide is comprised of a Cu oxide.

CLAIM 27 (Previously Presented) A superconducting apparatus comprising a composition having a transition temperature in excess of 26°K, said composition being a substituted Cu-oxide including a superconducting phase having a structure which is structurally substantially similar to the orthorhombic-tetragonal phase transition of said composition means for maintaining said composition at a temperature greater than said transition temperature to put said composition in a superconducting state; and means for passing current through said composition while in said superconducting state.

CLAIM 28 (Previously Presented) The superconducting apparatus of claim 27, where said substituted Cu-oxide includes a rare earth or rare earth-like element.

CLAIM 29 (Previously Presented) The superconducting apparatus of claim 27, where said substituted Cu-oxide includes an alkaline earth element.

CLAIM 30 (Previously Presented) The superconducting apparatus of claim 29, where said alkaline earth element is atomically large with respect to Cu.

CLAIM 31 (Previously Presented) The superconducting apparatus of claim 27, where said composition has a crystalline structure which enhances electron-phonon interactions to produce superconductivity at a temperature in excess of 26°K.

CLAIM 32 (Original) The superconducting apparatus of claim 31, where said crystalline structure is layer-like, enhancing the number of Jahn-Teller polarons in said composite.

CLAIM 33 (Previously Presented) A superconducting apparatus comprising a composition having a superconducting onset temperature in excess of 26°K, the composition being comprised of a copper oxide doped with an alkaline earth element where the concentration of said alkaline earth element is near to the concentration of said alkaline earth element where the superconducting copper oxide phase in said composition undergoes an orthorhombic to tetragonal structural phase transition.

CLAIM 34 (Previously Presented) A superconducting apparatus having a superconducting onset temperature in excess of 26°K, the composition being comprised of a mixed copper oxide doped with an element chosen to result in  $\text{Cu}^{3+}$  ions in said composition and a means for passing a superconducting current through said superconducting composition.

CLAIM 35 (Previously Presented) The superconducting apparatus of claim 34, where said doping element includes an alkaline earth element.

CLAIM 36 (Previously Presented) A combination comprising:

a composition having a superconducting onset temperature in excess of 26°K, said composition being comprised of a substituted copper oxide exhibiting mixed valence states and at least one other element in its crystalline structure,

means for passing a superconducting electrical current through said composition while said composition is at a temperature in excess of 26°K and less than said superconducting onset temperature, and

cooling means for cooling said composition to a superconducting state at a temperature in excess of 26°K.

CLAIM 37 (Original) The combination of claim 36, where said at least one other element is an alkaline earth element.

CLAIM 38 (Previously Presented) The combination of claim 36, where said at least one other element is an element which results in  $\text{Cu}^{3+}$  ions in said composition.

CLAIM 39 (Previously Presented) The combination of claim 36, where said at least one other element is an element chosen to result in the presence of both  $\text{Cu}^{2+}$  and  $\text{Cu}^{3+}$  ions in said composition.

3 / CLAIM 40 (Previously Presented) An apparatus comprising a superconductor exhibiting a superconducting onset at an onset temperature in excess of  $26^\circ\text{K}$ , said superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature in excess of  $26^\circ\text{K}$ , means for maintaining said superconductor at an operating temperature in excess of said onset temperature to maintain said superconductor in a superconducting state and means for passing current through said superconductor while in said superconducting state.

CLAIM 41 (Previously Presented) The apparatus of claim 40, where said elements include a transition metal and oxygen.

CLAIM 42 (Currently Amended) A apparatus having a superconducting onset temperature greater than  $26^\circ\text{K}$ , said superconductor being a doped transition metal oxide, where said transition metal is itself non-superconducting and means for passing a superconducting electric current through said composition.

CLAIM 43 (Previously Presented) The apparatus of claim 42, where said doped transition metal oxide is multivalent in said superconductor.

CLAIM 44 (Previously Presented) The apparatus of claim 42, further including an element

which creates a mixed valent state of said transition metal.

CLAIM 45 (Previously Presented) The apparatus of claim 43, where said transition metal is Cu.

CLAIM 46 (Previously Presented) An apparatus having a superconductor having a superconducting onset temperature greater than 26°K, said superconductor being an oxide having multivalent oxidation states and including a metal, said oxide having a crystalline structure which is oxygen deficient a means for passing a superconducting electric current through said superconductor.

CLAIM 47 (Original) The <sup>apparatus</sup>superconductor of claim 46, where said transition metal is Cu.

CLAIM 48 (Previously Presented) A superconductive apparatus comprising a superconductive composition comprised of a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said composition that said composition exhibits a superconducting onset at temperatures greater than 26°K, and a source of current for passing a superconducting electric current through said superconductor.

CLAIM 49 (Original) The composition of claim 48, where said transition metal oxide is multivalent in said composition.

CLAIM 50 (Original) The composition of claim 48, where said transition metal is Cu.

CLAIM 51 (Original) The composition of claim 48, where said substitutions include an alkaline earth element.

CLAIM 52 (Original) The composition of claim 48, where said substitutions include a rare earth or rare earth-like element.

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CLAIM 53 (Original) A superconductor comprised of a copper oxide having a layer-like crystalline structure and at least one additional element substituted in said crystalline structure, said structure being oxygen deficient and exhibiting a superconducting onset temperature in excess of 26°K.

CLAIM 54 (Original) The superconductor of claim 53, where said additional element creates a mixed valent state of said copper oxide in said superconductor.

CLAIM 55 (Previously Presented) A combination, comprising:

a transition metal oxide having an superconducting onset temperature greater than about 26°K and having an oxygen deficiency, said transition metal being non-superconducting at said superconducting onset temperature and said oxide having multivalent states,

means for passing an electrical superconducting current through said oxide while said oxide is at a temperature greater than 26°K, and

cooling means for cooling said oxide in a superconducting state at a temperature greater than 26°K.

CLAIM 56 (Original) The combination of claim 55, where said transition metal is Cu.

CLAIM 57 (Previously Presented) A combination including;

a superconducting oxide having a superconducting onset temperature in excess of 26°K and containing at least 3 elements which are non-superconducting at said onset temperature,

means for passing a superconducting current through said oxide while said oxide is maintained at a temperature greater than 26°K, and



means for maintaining said oxide in a superconducting state at a temperature greater than 26°K and less than said superconductive onset temperature.

CLAIM 58 (Previously Presented) A combination, comprised of:

a copper oxide superconductor having a superconductor onset temperature greater than about 26°K including an element which results in a mixed valent state in said oxide, said oxide being crystalline and having a layer-like structure,

means for passing a superconducting current through said copper oxide while it is maintained at a temperature greater than 26°K and less than said superconducting onset temperature, and

means for cooling said copper oxide to a superconductive state at a temperature greater than 26°K and less than said superconducting onset temperature.

CLAIM 59 (Previously Presented) A combination, comprised of:

a ceramic-like material having an onset of superconductivity at an onset temperature in excess of 26°K,

means for passing a superconducting electrical current through said ceramic-like material while said material is maintained at a temperature in excess of 26°K and less than said onset temperature, and

means for cooling said superconducting ceramic-like material to a superconductive state at a temperature greater than 26°K and less than said onset temperature, said material being superconductive at temperatures below said onset temperature and a ceramic at temperatures above said onset temperature.

CLAIM 60 (Previously Presented) An apparatus comprised of a transition metal oxide,

and at least one additional element, said superconductor having a distorted crystalline structure characterized by an oxygen deficiency and exhibiting a superconducting onset temperature in excess of 26°K, a source of current for passing a superconducting electric current in said transition metal oxide, and a cooling apparatus for maintaining said transition metal oxide below said onset temperature at a temperature in excess of 26°K.

CLAIM 61 (Previously Presented) The apparatus of claim 60, where said transition metal is Cu.

CLAIM 62 (Previously Presented) An apparatus comprised of a transition metal oxide and at least one additional element, said superconductor having a distorted crystalline structure characterized by an oxygen excess and exhibiting a superconducting onset temperature in excess of 26°K, a source of current for passing a superconducting electric current in said transition metal oxide, and a cooling apparatus for maintaining said transition metal oxide below said onset temperature and at a temperature in excess of 26°K.

CLAIM 63 (Previously Presented) The apparatus of claim 62, where said transition metal is Cu.

CLAIM 64 (Previously Presented) A combination, comprising:

a mixed copper oxide composition having enhanced polaron formation, said composition including an element causing said copper to have a mixed valent state in said composition, said composition further having a distorted octahedral oxygen environment leading to a  $T_c$  greater than 26°K,

means for providing a superconducting current through said composition at temperatures greater than 26°K and less than said  $T_c$ , and

cooling means for cooling said composition to a temperature greater than 26°K and less

than said  $T_c$ .

CLAIM 65 (Previously Presented) An apparatus composition exhibiting superconductivity at temperatures greater than 26°K, said composition being a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said composition, and O is oxygen, the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE : AE, a source of current for passing a superconducting electric current in said transition metal oxide, and a cooling apparatus for maintaining said transition metal oxide below said onset temperature and at a temperature in excess of 26°K.

3 CLAIM 66 (Previously Presented) A superconductive composition having a transition temperature greater than 26°K, the composition including a multivalent transition metal oxide and at least one additional element, said composition having a distorted orthorhombic crystalline structure, a source of current for passing a superconducting electric current in said transition metal oxide, and a cooling apparatus for maintaining said transition metal oxide below said onset temperature and at a temperature in excess of 26°K.

CLAIM 67 (Previously Presented) The apparatus of claim 66, where said transition metal oxide is a mixed copper oxide.

CLAIM 68 (Previously Presented) The apparatus of claim 67, where said one additional element is an alkaline earth element.

CLAIM 69 (Previously Presented) A superconductive combination, comprising:

a superconducting composition exhibiting a superconducting transition temperature greater than 26°K, said composition being a transition metal oxide having a distorted orthorhombic crystalline structure, and

means for passing a superconducting electrical current through said composition while said composition is at a temperature greater than 26°K and less than said superconducting transition temperature.

CLAIM 70 (Original) The combination of claim 69, where said transition metal oxide is a mixed copper oxide.

CLAIM 71 (Original) The combination of claim 70, where said mixed copper oxide includes an alkaline earth element.

CLAIM 72 (Original) The combination of claim 71, where said mixed copper oxide further includes a rare earth or rare earth-like element.

CLAIM 73 (Original) A method for making a superconductor having a superconducting onset temperature  $> 26^{\circ}\text{K}$ , said method including the steps of:

preparing powders of oxygen-containing compounds of a rare earth or rare earth-like element, an alkaline earth element, and copper,

mixing said compounds and firing said mixture to create a mixed copper oxide composition including said alkaline earth element and said rare earth or rare earth-like element, and

annealing said mixed copper oxide composition at an elevated temperature less than about  $950^{\circ}\text{C}$  in an atmosphere including oxygen to produce a superconducting composition having a mixed copper oxide phase exhibiting a superconducting onset temperature greater than  $26^{\circ}\text{K}$ , said superconducting composition having a layer-like crystalline structure after said annealing step.

CLAIM 74 (Original) The method of claim 73, where the amount of oxygen incorporated

into said composition is adjusted by said annealing step, the amount of oxygen therein affecting the critical temperature  $T_c$  of the superconducting composition.

CLAIM 75 (Original) A method for making a superconductor having a superconducting onset temperature greater than  $26^\circ\text{K}$ , said superconductor being comprised of a rare earth or rare earth-like element (RE), an alkaline earth element (AE), copper (CU), and oxygen (O) and having the general formula RE-AE-CU-O, said method including the steps of combining said rare earth or rare earth-like element, said alkaline earth element and said copper in the presence of oxygen to produce a mixed copper oxide including said rare earth or rare earth-like element and said alkaline earth element therein, and heating said mixed copper oxide to produce a superconductor having a crystalline layer-like structure and exhibiting a superconducting onset temperature greater than  $26^\circ\text{K}$  the critical transition temperature of said superconductor being dependent on the amount of said alkaline earth element therein.

CLAIM 76 (Original) The method of claim 75, where said heating step is done in an atmosphere including oxygen.

CLAIM 77 (Previously Presented) A combination, comprising:

a mixed copper oxide composition including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE), said composition having a layer-like crystalline structure and multi-valent oxidation states, said composition exhibiting a substantially zero resistance to the flow of electrical current therethrough when cooled to a superconducting state at a temperature in excess of  $26^\circ\text{K}$ , said mixed copper oxide having a superconducting onset temperature greater than  $26^\circ\text{K}$ , and


electrical means for passing an electrical superconducting current through said composition when said composition exhibits substantially zero resistance at a temperature greater than  $26^\circ\text{K}$  and less than said onset temperature.

CLAIM 78 (Original) The combination of claim 77, where the ratio (AE,RE) : Cu is substantially 1:1.

CLAIM 79 (Original) The combination of claim 77, where the ratio (AE,RE) : Cu is substantially 1:1.

CLAIM 80 (Original) The combination of claim 77, wherein said crystalline structure is perovskite-like.

CLAIM 81 (Original) The combination of claim 77, where said mixed copper oxide composition has a non-stoichiometric amount of oxygen therein.

 CLAIM 82 (Currently Amended) A method for making a superconductor having a superconducting onset temperature greater than 26°K, said superconductor being comprised of a rare earth or rare earth-like element (RE), an alkaline earth element (AE), a transition metal element (TM), and Oxygen (O) and having the general formula RE-AE-TM-O, said method including the steps of combining said rare earth or rare earth-like element, said alkaline earth element and said transition metal element in the presence of oxygen to produce a mixed transition metal oxide including said rare earth or rare earth-like element and said alkaline earth element therein, and

heating said mixed transition metal oxide to produce ~~superconductor~~ superconductor having a crystalline layer-like structure and exhibiting a superconducting onset temperature greater than 26°K, said superconductor having a non-stoichiometric amount of oxygen therein.

CLAIM 83 (Previously Presented) The method of claim 82, where said transition metal is copper.

CLAIM 84 (Previously Presented) A superconducting combination, comprising:

a mixed transition metal oxide composition containing a non-stoichiometric amount of oxygen therein, a transition metal and at least one additional element, said composition having substantially zero resistance to the flow of electricity therethrough when cooled to a superconducting state at a temperature greater than 26°K, said mixed transition metal oxide has a superconducting onset temperature in excess of 26°K, and

electrical means for passing an electrical superconducting current through said composition when said composition is in said superconducting state at a temperature greater than 26°K, and less than said superconducting onset temperature.

CLAIM 85 (Original) The combination of claim 84, where said transition metal is copper.

CLAIM 86 (Previously Presented) An apparatus comprising:

a composition including a transition metal, a rare earth or rare earth-like element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting onset temperature greater than 26°K,

means for maintaining said composition to said superconducting state at a temperature greater than 26°K and less than said superconducting onset temperature, and

means for passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 87 (Original) The method of claim 86, where said transition metal is copper.

CLAIM 88 (Original) A method, including the steps of:

forming a composition exhibiting a superconductive state at a temperature in excess of

26°K,

cooling said composition to a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state, and

passing an electrical current through said composition while said composition is in said superconductive state.

CLAIM 89 (Original) The method of claim 88, where said composition is comprised of a metal oxide.

CLAIM 90 (Original) The metal of claim 88, where said composition is comprised of a transition metal oxide.

CLAIM 91 (Currently Amended) A combination, comprising:

a composition exhibiting the onset of a DC substantially zero resistance state at an onset temperature in excess of ~~[[30K]]~~ 30°K, and

means for passing an electrical current through said composition while it is in said substantially zero resistance state.

CLAIM 92 (Previously Presented) The combination of claim 91, where said composition is a copper oxide.

CLAIM 93 (Currently Amended) An apparatus, comprising:

a mixed copper oxide material exhibiting an onset of superconductivity at an onset temperature greater than ~~[[26K]]~~ 26°K, and

means for producing an electrical current through said copper oxide material while it is in



a superconducting state at a temperature in excess of ~~[[26K]]~~ 26°K.

CLAIM 94 (Currently Amended) The apparatus of claim 93, where said copper oxide material exhibits a layer-like crystalline ~~[[struc]]~~ structure.

CLAIM 95 (Previously Presented) The apparatus of claim 93, where said copper oxide material exhibits a mixed valence state.

CLAIM ~~96~~ (Currently Amended) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of ~~[[26K]]~~ 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition comprising a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductor transition temperature  $T_c$  of greater than ~~[[26K]]~~ 26°K;

(b) means for maintaining the superconductor element at a temperature above ~~[[26K]]~~ 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) means for causing an electric current to flow in the superconductor element.

CLAIM 97 (Previously Presented) The superconductive apparatus according to claim 96 in which the copper-oxide compound of the superconductive composition includes at least one rare-earth or rare-earth-like element and at least one alkaline-earth element.

CLAIM 98 (Previously Presented) The superconductive apparatus according to claim 97 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 99 (Previously Presented) The superconductive apparatus according to claim 97 in which the alkaline-earth element is barium.

CLAIM 100 (Previously Presented) The superconductive apparatus according to claim 96 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 101 (Previously Presented) The superconductive apparatus according to claim 100 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 102 (Previously Presented) The superconductive apparatus according to claim 101 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 103 (Currently Amended) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one rare-earth or rare-earth-like element and at least one alkaline-earth element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{\rho=0}$ , the transition-onset temperature  $T_c$  being greater than  $[[26K]]$  26°K;

(b) means for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{\rho=0}$  of the superconductive composition; and

(c) means for causing an electric current to flow in the superconductor element.

CLAIM 104 (Previously Presented) The superconductive apparatus according to claim 103 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 105 (Previously Presented) The superconductive apparatus according to claim 103 in which the alkaline-earth element is barium.

CLAIM 106 (Previously Presented) The superconductive apparatus according to claim 103 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 107 (Previously Presented) The superconductive apparatus according to claim 106 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 108 (Previously Presented) The superconductive apparatus according to claim 107 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 109 (Previously Presented) A superconductive apparatus comprising a composition having a transition temperature greater than 26°K, the composition including a rare earth or alkaline earth element, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature in excess of 26°K means for maintaining said composition at said temperature to exhibit said superconductivity and means for passing an electrical superconducting current through said composition while exhibiting said superconductivity.

CLAIM 110 (Previously Presented) The combination of claim 15, where said additional element is rare earth or alkaline earth element.

CLAIM 111 (Previously Presented) A device comprising a superconducting transition metal oxide having a superconductive onset temperature greater than 26°K, said superconducting transition metal oxide being at a temperature less than said superconducting onset temperature and having a superconducting current flowing therein.

CLAIM 112 (Currently Amended) A device comprising a superconducting copper oxide having a superconductive onset temperature greater than 26°K, said superconducting copper oxide being at a temperature less than said superconducting onset temperature and having a ~~superconducting~~ superconducting current flowing therein.

CLAIM 113 (Currently Amended) A device comprising a superconducting oxide composition having a superconductive onset temperature greater than 26°K, said superconducting copper oxide being at a temperature less than said superconducting onset temperature and having a ~~superconducting~~ superconducting current flowing therein, said composition comprising at least one each of rare earth, an alkaline earth, and copper.

CLAIM 114 (Currently Amended) A device comprising a superconducting oxide composition having a superconductive onset temperature greater than 26°K, said superconducting copper oxide being at a temperature less than said superconducting onset temperature and having a ~~superconducting~~ superconducting current flowing therein, said composition comprising at least one each of a group IIIB element, an alkaline earth, and copper.

CLAIM 115 (Previously Presented) A device comprising a transition metal oxide having a  $T_c$  greater than 26°K carrying a superconducting current said transition metal oxide is maintained at a temperature less than said  $T_c$ .

CLAIM 116 (Previously Presented) An apparatus comprising a transition metal oxide having a  $T_c$  greater than 26°K carrying a superconducting current said transition metal oxide is maintained at a temperature less than said  $T_c$ .

CLAIM 117 (Previously Presented) A structure comprising a transition metal oxide having a  $T_c$  greater than 26°K carrying a superconducting current.

CLAIM 118 (Previously Presented) An invention comprising a transition metal oxide having a  $T_c$  greater than 26°K carrying a superconducting current.

CLAIM 119 (Previously Presented) A device comprising a copper oxide having a  $T_c$  greater than 26°K carrying a superconducting current said copper oxide is maintained at a temperature less than said  $T_c$ .

CLAIM 120 (Previously Presented) An apparatus comprising a copper oxide having a  $T_c$  greater than 26°K carrying a superconducting current said copper oxide is maintained at a temperature less than said  $T_c$ .

CLAIM 121 (Previously Presented) A device comprising a copper oxide having a  $T_c$  greater than 26°K carrying a superconducting current.

CLAIM 122 (Previously Presented) An invention comprising a copper oxide having a  $T_c$  greater than 26°K carrying a superconducting current.

CLAIM 123 (Previously Presented) A superconductive apparatus comprising:

a composition of the formula  $Ba_xLa_{x-5}Cu_5O_y$  wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature in excess of 26°K;

a means for maintaining the temperature of said composition at a temperature less than said critical temperature to induce said superconducting state in said metal oxide phase; and

a means for passing an electrical current through said composition while said metal oxide phase is in said superconducting state.

CLAIM 124 (Previously Presented) A device comprising a composition of matter having a  $T_c$  greater than  $26^\circ\text{K}$  carrying a superconducting current, said composition comprising at least one each of a IIIB element, an alkaline earth, and copper oxide said device is maintained at a temperature less than said  $T_c$ .

CLAIM 125 (Previously Presented) An apparatus comprising a composition of matter having a  $T_c$  greater than  $26^\circ\text{K}$  carrying a superconducting current, said composition comprising at least one each of a rare earth, an alkaline earth, and copper oxide.

CLAIM 126 (Previously Presented) A device comprising a composition of matter having a  $T_c$  greater than  $26^\circ\text{K}$  carrying a superconducting current, said composition comprising at least one each of a rare earth, and copper oxide.

CLAIM 127 (Previously Presented) A device comprising a composition of matter having a  $T_c$  greater than  $26^\circ\text{K}$  carrying a superconducting current, said composition comprising at least one each of a IIIB element, and copper oxide.

CLAIM 128 (Previously Presented) A transition metal oxide device comprising a  $T_c > 26^\circ\text{K}$  and carrying a superconducting current.

CLAIM 129 (Previously Presented) A copper oxide device comprising a  $T_c > 26^\circ\text{K}$  and carrying a superconducting current.

CLAIM 130 (Previously Presented) A superconductive apparatus comprising a composition having a transition temperature greater than 26°K, the composition including a rare earth or Group III B element, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature in excess of 26°K, a means for maintaining said composition at said temperature to exhibit said superconductivity and means for passing an electrical superconducting current through said composition which exhibiting said superconductivity.

CLAIM 131 (Previously Presented) The combination of claim 15, where said additional element is a rare earth or Group III B element.

CLAIM 132 (Previously Presented) The combination of claim 12, where said composition includes a substantially perovskite superconducting phase.

CLAIM 133 (Previously Presented) The superconducting apparatus of claim 27, where said substituted Cu-oxide includes a rare earth or Group III B element.

CLAIM 134 (Previously Presented) The combination of claim 71, where said mixed copper oxide further includes a rare earth or Group III B element.

CLAIM 135 (Previously Presented) A combination, comprising:

a mixed copper oxide composition including an alkaline earth element (AE) and a rare earth or Group III B element (RE), said composition having a substantially layered crystalline structure and multi-valent oxidation states, said composition exhibiting a substantially zero resistance to the flow of electrical current therethrough when in a superconducting state at a temperature in excess of 26°K, said mixed copper oxide having a superconducting onset temperature greater than 26°K and,

electrical means for passing an electrical superconducting current through said composition when said composition exhibits substantially zero resistance at a temperature greater than 26°K and less than said onset temperature.

CLAIM 136 (Previously Presented) The combination of claim 77, where said crystalline structure is substantially perovskite.

CLAIM 137 (Previously Presented) An apparatus comprising:

a composition including a transition metal, a rare earth or Group III B element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K,

means for maintaining said composition in said superconducting state at a temperature greater than 26°K, and less than said superconducting onset temperature, and

means for passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 138 (Previously Presented) The apparatus of claim 93, where said copper oxide material exhibits a substantially layered crystalline structure.

CLAIM 139 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the



composition having a superconductor transition temperature  $T_c$  of greater than 26°K;

(b) means for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) means for causing an electric current to flow in the superconductor element.

CLAIM 140 (Currently Amended) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one rare-earth or Group III B element and at least one alkaline-earth element, the composition having a superconductive/resistive transition defining a ~~superconductive/resistive transition~~ superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{r=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) means for maintaining the superconductor element at a temperature below the effectively-zero-bulk- resistivity intercept temperature  $T_{r=0}$  of the superconductive composition; and

(c) means for causing an electric current to flow in the superconductor element.

CLAIM 141 (Previously Presented) An apparatus comprising a transition metal oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K,

a temperature controller maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase, and

a current source passing an electrical supercurrent through said transition metal oxide while it is in said superconducting state.

CLAIM 142 (Previously Presented) The apparatus of claim 141, where said transition metal oxide is comprised of a transition metal capable of exhibiting multivalent states.

CLAIM 143 (Previously Presented) The apparatus of claim 141, where said transition metal oxide is comprised of a Cu oxide.

CLAIM 144 (Previously Presented) An apparatus comprising:

a composition including a transition metal, a rare earth or rare earth-like element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K,

a temperature controller maintaining said composition in said superconducting state at a temperature greater than 26°K, and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 145 (Previously Presented) The method of claim 144, where said transition metal is copper.

CLAIM 146 (Previously Presented) An apparatus:

a composition exhibiting a superconductive state at a temperature in excess of 26°K,

a temperature controller maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state, and

a current source passing an electrical current through said composition while said composition is in said superconductive state.

CLAIM 147 (Previously Presented) The apparatus of claim 146, where said composition is comprised of a metal oxide.

CLAIM 148 (Previously Presented) The apparatus of claim 146, where said composition is comprised of a transition metal oxide.

CLAIM 149 (Previously Presented) A superconductive apparatus for causing electric current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductor transition temperature  $T_c$  of greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

CLAIM 150 (Previously Presented) The superconductive apparatus according to claim 149 in which the copper-oxide compound of the superconductive composition includes at least one rare-earth or rare-earth-like element and at least one alkaline-earth element.

CLAIM 151 (Previously Presented) The superconductive apparatus according to claim 150 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 152 (Previously Presented) The superconductive apparatus according to claim 150 in which the alkaline-earth element is barium.

CLAIM 153 (Previously Presented) The superconductive apparatus according to claim 149 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 154 (Previously Presented) The superconductive apparatus according to claim 153 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 155 (Previously Presented) The superconductive apparatus according to claim 154 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.


CLAIM 156 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide

compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one rare-earth or rare-earth-like element and at least one alkaline-earth element, the composition having a superconductive/resistive-transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.



CLAIM 157 (Previously Presented) The superconductive apparatus according to claim 156 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 158 (Previously Presented) The superconductive apparatus according to claim 156 in which the alkaline-earth element is barium.

CLAIM 159 (Previously Presented) The superconductive apparatus according to claim 156 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 160 (Previously Presented) The superconductive apparatus according to claim 159 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 161 (Previously Presented) The superconductive apparatus according to claim 160 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 162 (Previously Presented) An apparatus including copper oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a current source passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element.

CLAIM 163 (Previously Presented) An apparatus comprising:

a composition including copper, oxygen and any element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 164 (Previously Presented) An apparatus comprising:


a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a current source passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and an element selected from the group consisting of Group II A element, a rare earth element and a Group III B element.

CLAIM 165 (Previously Presented) An apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:



(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, a rare earth element; and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 166 (Previously Presented) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk- resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 167 (Previously Presented) An apparatus comprising:

a copper oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller maintaining the temperature of said material at a temperature , less than said critical temperature to produce said superconducting state in said phase;

a current source passing an electrical supercurrent through said copper oxide while it is in said superconducting state;



said copper oxide includes an element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 168 (Previously Presented) An apparatus comprising:

a composition including copper, oxygen and an element selected from the group consisting of at least one Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 169 (Previously Presented) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a current source passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and at least one element selected from the group consisting of Group II A and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 170 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 171 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a

superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 172 (Previously Presented) An apparatus comprising:

a transition metal oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a current source passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said transitional metal oxide includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 173 (Previously Presented) An apparatus comprising:

a composition including a transition metal, oxygen and an element selected from the group consisting of a Group II A element and at least one element selected from the group

consisting of a rare earth element and a Group III B element, where said composition is a mixed transitional metal oxide formed from said transition metal and said oxygen, said mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 174 (Previously Presented) An apparatus:

forming a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a current source passing an electrical current through said composition while said composition is in said superconductive state; and


said composition including a transitional metal oxide and at least one element selected from the group consisting of Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 175 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes an element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.



CLAIM 176 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal-oxide compound having a layer-type perovskite-like crystal structure, the transition metal-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk- resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 177 (Previously Presented) An apparatus comprising:

a copper oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a current source passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one Group II A element, and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 178 (Previously Presented) An apparatus comprising:

a composition including copper, oxygen, a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 179 (Previously Presented) A structure comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a current source passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide, a Group II A element, at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 180 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes a Group II A element, and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 181 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

- (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including Group II A element, and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition having a superconductive-resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;
- (b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and
- (c) a current source causing an electric current to flow in the superconductor element.

CLAIM 182 (Previously Presented) An apparatus comprising a composition having a transition temperature greater than 26°K, the composition including a rare earth or alkaline earth element, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature in excess of 26°K, a temperature controller maintaining said composition at said temperature to exhibit said superconductivity and a current source passing an electrical superconducting current through said composition with said phase exhibiting said superconductivity.

CLAIM 183 (Previously Presented) An apparatus comprising a superconducting transition metal oxide having a superconductive onset temperature greater than 26°K, a temperature controller maintaining said superconducting transition metal oxide at a



temperature less than said superconducting onset temperature and a current source flowing a superconducting current therein.

CLAIM 184 (Previously Presented) An apparatus comprising a superconducting copper oxide having a superconductive onset temperature greater than 26°K, a temperature controller maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a current source flowing a superconducting current in said superconducting oxide.

CLAIM 185 (Previously Presented) An apparatus comprising a superconducting oxide composition having a superconductive onset temperature greater than 26°K, a temperature controller maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a current source flowing a superconducting current therein, said composition comprising at least one each of rare earth, an alkaline earth, and copper.

CLAIM 186 (Previously Presented) An apparatus comprising a superconducting oxide composition having a superconductive onset temperature greater than 26°K, a temperature controller maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a current source flowing a superconducting electrical current therein, said composition comprising at least one each of a Group III B element, an alkaline earth, and copper.

CLAIM 187 (Previously Presented) An apparatus comprising a superconducting electrical current in a transition metal oxide having a  $T_c$  greater than 26°K and maintaining said transition metal oxide at a temperature less than said  $T_c$ .

CLAIM 188 (Previously Presented) An apparatus comprising a current source flowing a superconducting current in a copper oxide having a  $T_c$  greater than 26°K and a temperature controller maintaining said copper oxide at a temperature less than said  $T_c$ .

CLAIM 189 (Previously Presented) An apparatus comprising the steps of:

a composition of the formula  $Ba_xLa_{x-5}Cu_{50}Y$ , wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller maintaining the temperature of said composition at a temperature less than said critical temperature to induce said superconducting state in said metal oxide phase; and

a current source passing an electrical current through said composition while said metal oxide phase is in said superconducting state.

CLAIM 190 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a composition of matter having a  $T_c$  greater than 26°K, said composition comprising at least one each of a Group III B element, an alkaline earth, and copper oxide and a temperature controller maintaining said composition of matter at a temperature less than  $T_c$ .

CLAIM 191 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a composition of matter having a  $T_c$  greater than 26°K, said composition comprising at least one each of a rare earth, alkaline earth, and copper oxide and a temperature controller maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 192 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a composition of matter having a  $T_c$  greater than 26°K, said composition comprising at least one each of a rare earth, and copper oxide

and a temperature controller maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 193 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a composition of matter having a  $T_c$  greater than  $26^\circ\text{K}$  carrying, said composition comprising at least one each of a Group III B element, and copper oxide and a temperature controller maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 194 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a transition metal oxide comprising a  $T_c > 26^\circ\text{K}$  and a temperature controller maintaining said transition metal oxide at a temperature less than said  $T_c$ .

CLAIM 195 (Previously Presented) An apparatus comprising a current source flowing a superconducting electrical current in a copper oxide composition of matter comprising a  $T_c > 26^\circ\text{K}$  and a temperature controller maintaining said copper oxide composition of matter at a temperature less than said  $T_c$ .

CLAIM 196 (Previously Presented) An apparatus comprising:

a composition including a transition metal, a Group III B element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than  $26^\circ\text{K}$ ,

a temperature controller maintaining said composition in said superconducting state at a temperature greater than  $26^\circ\text{K}$ , and

a current source passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 197 (Previously Presented) The apparatus of claim 196, where said transition metal is copper.

CLAIM 198 (Previously Presented) A superconductive apparatus for causing electric current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductor transition temperature  $T_c$  of greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 199 (Previously Presented) The superconductive apparatus according to claim 198 in which the copper-oxide compound of the superconductive composition includes at least one element selected from the group consisting of a rare-earth element, a Group III B element and an alkaline-earth element.

CLAIM 200 (Previously Presented) The superconductive apparatus according to claim 199 in which the rare-earth is lanthanum.

CLAIM 201 (Previously Presented) The superconductive apparatus according to claim 199 in which the alkaline-earth element is barium.

CLAIM 202 (Previously Presented) The superconductive apparatus according to claim 198 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 203 (Previously Presented) The superconductive apparatus according to claim 202 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 204 (Previously Presented) The superconductive apparatus according to claim 203 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 205 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a rare-earth element, a Group III B element and an alkaline-earth element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 206 (Previously Presented) The superconductive apparatus according to claim 205 in which said at least one element is lanthanum.

CLAIM 207 (Previously Presented) The superconductive apparatus according to claim 205 in which the alkaline-earth element is barium.

CLAIM 208 (Previously Presented) The superconductive apparatus according to claim 205 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

91 CLAIM 209 (Previously Presented) The superconductive apparatus according to claim 208 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 210 (Previously Presented) The superconductive apparatus according to claim 209 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 211 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:


(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element

selected from the group consisting of a Group II A element, a rare earth element; and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 212 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:



1(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 213 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 214 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept




temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than  $26^\circ\text{K}$ ;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 215 (Previously Presented) A superconductive apparatus for causing electric-current flow in a superconductive state at a temperature in excess of  $26^\circ\text{K}$ , comprising:



(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature  $T_c$  of greater than  $26^\circ\text{K}$ , said superconductive composition includes a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller maintaining the superconductor element at a temperature above  $26^\circ\text{K}$  and below the superconductor transition  $T_c$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 216 (Previously Presented) A superconductive apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal-oxide compound having a substantially layered perovskite crystal structure, the transition metal-oxide compound including a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a current source causing an electric current to flow in the superconductor element.

CLAIM 217 (Previously Presented) An apparatus according to claim 182 wherein said composition comprises a substantially layered perovskite crystal structure.

CLAIM 218 (Previously Presented) An apparatus according to claim 183 wherein said superconducting transistor metal oxide comprises a substantially layered perovskite crystal structure.

CLAIM 219 (Previously Presented) An apparatus according to claim 184 wherein said superconducting copper oxide comprises a substantially layered perovskite crystal structure.

CLAIM 220 (Previously Presented) An apparatus according to claim 185 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

CLAIM 221 (Previously Presented) An apparatus according to claim 186 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

CLAIM 222 (Previously Presented) An apparatus according to claim 187 wherein said transistor metal oxide comprises a substantially layered perovskite crystal structure.

CLAIM 223 (Previously Presented) An apparatus according to claim 188 wherein said copper oxide comprises a substantially layered perovskite crystal structure.

CLAIM 224 (Previously Presented) An apparatus according to claim 189 wherein said composition comprises a substantially layered perovskite crystal structure.

CLAIM 225 (Previously Presented) An apparatus according to claim 190 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

CLAIM 226 (Previously Presented) An apparatus according to claim 191 wherein said composition of matter comprises substantially layered perovskite crystal structure.

CLAIM 227 (Previously Presented) An apparatus according to claim 192 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

CLAIM 228 (Previously Presented) An apparatus according to claim 193 wherein said composition of matter comprises substantially layered perovskite crystal structure.

CLAIM 229 (Previously Presented) An apparatus according to claim 194 wherein said transistor metal oxide comprises substantially layered perovskite crystal structure.

CLAIM 230 (Previously Presented) An apparatus according to claim 195 wherein said copper oxide composition comprises substantially layered perovskite crystal structure.

CLAIM 231 (Previously Presented) An apparatus comprising a composition of matter having a  $T_c$  greater than 26°K carrying a superconducting current, said composition comprising at least one each of a rare earth, an alkaline earth, and copper oxide.

CLAIM 232 (New) An apparatus comprising:

a transition metal oxide comprising a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K,

a temperature controller for maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase, and

a source of an electrical supercurrent through said transition metal oxide while it is in said superconducting state.

CLAIM 233 (New) An apparatus according to claim 232, where said transition metal oxide is comprised of a transition metal capable of exhibiting multivalent states.

CLAIM 234 (New) An apparatus according to claim 232, where said transition metal oxide is comprised of a Cu oxide.

CLAIM 235 (New) An apparatus comprising:

a composition including a transition metal, a rare earth or rare earth-like element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal

oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K,

a temperature controller for maintaining said composition in said superconducting state at a temperature greater than 26°K, and

a source of an electrical current through said composition while said composition is in said superconducting state.

CLAIM 236 (New) An apparatus according to claim 235, where said transition metal is copper.

CLAIM 237 (New) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K, a temperature controller for maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state, and

a source of an electrical current through said composition while said composition is in said superconductive state.

CLAIM 238 (New) An apparatus according to claim 237, where said composition is comprised of a metal oxide.

CLAIM 239 (New) An apparatus according to claim 238, where said composition is comprised of a transition metal oxide.

CLAIM 240 (New) An apparatus capable of carrying electric current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the composition comprising a superconductor transition temperature  $T_c$  of greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 241 (New) An apparatus according to claim 240 in which the copper-oxide compound of the superconductive composition includes at least one rare-earth or rare-earth-like element and at least one alkaline-earth element.

CLAIM 242 (New) An apparatus according to claim 241 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 243 (New) An apparatus according to claim 241 in which the alkaline-earth element is barium.

CLAIM 244 (New) An apparatus according to claim 240 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 245 (New) An apparatus according to claim 244 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 246 (New) An apparatus according to claim 245 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 247 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one rare-earth or rare-earth-like element and at least one alkaline-earth element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 248 (New) An apparatus according to claim 247 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 249 (New) An apparatus according to claim 247 in which the alkaline-earth element is barium.

CLAIM 250 (New) An apparatus according to claim 247 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 251 (New) An apparatus according to claim 250 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 252 (New) An apparatus according to claim 251 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 253 (New) An apparatus comprising:

a copper oxide comprising a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller for maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a source of an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element.

CLAIM 254 (New) An apparatus comprising:

a composition including copper, oxygen and an element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, where said composition is a mixed copper oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller for maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a source of an electrical current through said composition while said composition is in said superconducting state.



CLAIM 255 (New) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller for maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a source of an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and an element selected from the group consisting of Group II A element, a rare earth element and a Group III B element.

CLAIM 256 (New) An apparatus capable of carrying an electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, a rare earth element; and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 257 (New) An apparatus capable of carrying an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 258 (New) An apparatus comprising:

a copper oxide comprising a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller for maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a source of an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 259 (New) An apparatus comprising:

a composition including copper, oxygen and an element selected from the group consisting of at least one Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, where said composition is a mixed copper oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature for maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a source of an electrical current through said composition while said composition is in said superconducting state.

CLAIM 260 (New) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature for maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a source of an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and at least one element selected from the group consisting of Group II A and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 261 (New) An apparatus capable of carrying an electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than  $26^\circ\text{K}$ , said superconductive composition includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above  $26^\circ\text{K}$  and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 262 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than  $26^\circ\text{K}$ ;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 263 (New) An apparatus comprising:

a transition metal oxide comprising a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller for maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a source of an electrical supercurrent through said copper oxide while it is in said superconducting state;

said transitional metal oxide includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIMS 264 (New) An apparatus comprising:

a composition including a transition metal, oxygen and an element selected from the group consisting of at least one Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, where said composition is a mixed transitional metal oxide formed from said transition metal and said oxygen, said mixed transition metal oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller for maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a source of an electrical current through said composition while said composition is in said superconducting state.

CLAIM 265 (New) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;

a temperature controller for maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a source of an electrical current through said composition while said composition is in said superconductive state; and

said composition including a transitional metal oxide and at least one element selected from the group consisting of Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element.

CLAIM 266 (New) An apparatus capable of carrying an electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal oxide compound comprising a layer-type perovskite-like crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 267 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal-oxide compound comprising a layer-type perovskite-like crystal structure, the transition metal-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 268 (New) An apparatus comprising:

a copper oxide comprising a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller for maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

a source for an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from group consisting of a Group II A element, at least one element selected from the group consisting of a rare earth element and at least one element selected from the group consisting of a Group III B element.

CLAIM 269 (New) An apparatus comprising:

a composition including copper, oxygen and an element selected from the group consisting of at least one Group II A element and at least one element selected from the group consisting of a rare earth element at least one element selected from the group consisting of a Group III B element, where said composition is a mixed copper oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K;

a temperature controller for maintaining said composition in said superconducting state at a temperature greater than 26°K; and

a source of an electrical current through said composition while said composition is in said superconducting state.

CLAIM 270 (New) An apparatus comprising:

a composition exhibiting a superconductive state at a temperature in excess of 26°K;



a temperature controller for maintaining said composition at a temperature in excess of 26°K at which temperature said composition exhibits said superconductive state;

a source of an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and at least one element selected from the group consisting of Group II A element, at least one element selected from the group consisting of a rare earth element and at least one element selected from the group consisting of a Group III B element.

CLAIM 271 (New) An apparatus for causing an electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting

essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, at least one element selected from the group consisting of a rare earth element and at least one element selected from the group consisting of a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 272 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a group II A element, at least one element selected from the group consisting of a rare earth element and at least one element selected from the group consisting of a Group III B element, the composition comprising a superconductive-resistive transition temperature defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 273 (New) An apparatus comprising a composition comprising a transition temperature greater than 26°K, the composition including a rare earth or alkaline earth element, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature in excess of 26°K, a temperature controller for maintaining said composition at said temperature to exhibit said superconductivity and a source of an electrical superconducting current through said composition with said phase exhibiting said superconductivity.

CLAIM 274 (New) An apparatus comprising providing a superconducting transition metal oxide comprising a superconductive onset temperature greater than 26°K, a temperature

controller for maintaining said superconducting transition metal oxide at a temperature less than said superconducting onset temperature and a source of a superconducting current therein.

CLAIM 275 (New) An apparatus comprising a superconducting copper oxide comprising a superconductive onset temperature greater than 26°K, a temperature controller for maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a source of a superconducting current in said superconducting oxide.

CLAIM 276 (New) An apparatus comprising a superconducting oxide composition comprising a superconductive onset temperature greater than 26°K, a temperature controller for maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a source of a superconducting current therein, said composition comprising at least one each of rare earth, an alkaline earth, and copper.

CLAIM 277 (New) An apparatus comprising a superconducting oxide composition comprising a superconductive onset temperature greater than 26°K, a temperature controller for maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and a source of a superconducting electrical current therein, said composition comprising at least one each of a Group III B element, an alkaline earth, and copper.

CLAIM 278 (New) An apparatus comprising a source of a superconducting electrical current in a transition metal oxide comprising a  $T_c$  greater than 26°K and a temperature controller for maintaining said transition metal oxide at a temperature less than said  $T_c$ .

CLAIM 279 (New) An apparatus comprising a source of a superconducting current in a copper oxide comprising a  $T_c$  greater than 26°K and a temperature controller for maintaining said copper oxide at a temperature less than said  $T_c$ .

CLAIM 280 (New) An apparatus comprising:

a composition of the formula  $Ba_xLa_{x-5}Cu_5O_y$ , wherein  $x$  is from about 0.75 to about 1 and  $y$  is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition comprising a metal oxide phase which exhibits a superconducting state at a critical temperature in excess of 26°K;

a temperature controller for maintaining the temperature of said composition at a temperature less than said critical temperature to induce said superconducting state in said metal oxide phase; and

a source of an electrical current through said composition while said metal oxide phase is in said superconducting state.

3 CLAIM 281 (New) An apparatus comprising a source of a superconducting electrical current in a composition of matter comprising a  $T_c$  greater than 26°K, said composition comprising at least one each of a III B element, an alkaline earth, and copper oxide and a temperature controller for maintaining said composition of matter at a temperature less than  $T_c$ .

CLAIM 282 (New) An apparatus comprising a source of a superconducting electrical current in a composition of matter comprising a  $T_c$  greater than 26°K, said composition comprising at least one each of a rare earth, alkaline earth, and copper oxide and a temperature controller for maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 283 (New) An apparatus comprising a source of a superconducting electrical current in a composition of matter comprising a  $T_c$  greater than 26°K, said composition

comprising at least one each of a rare earth, and copper oxide and a temperature controller for maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 284 (New) An apparatus comprising a source of a superconducting electrical current in a composition of matter comprising a  $T_c$  greater than  $26^\circ\text{K}$  carrying, said composition comprising at least one each of a III B element, and copper oxide and a temperature controller for maintaining said composition of matter at a temperature less than said  $T_c$ .

CLAIM 285 (New) An apparatus comprising a source of a superconducting electrical current in a transition metal oxide comprising a  $T_c > 26^\circ\text{K}$  and a temperature controller for maintaining said transition metal oxide at a temperature less than said  $T_c$ .

CLAIM 286 (New) An apparatus comprising a source of a superconducting electrical current in a copper oxide composition of matter comprising a  $T_c > 26^\circ\text{K}$  and a temperature controller for maintaining said copper oxide composition of matter at a temperature less than said  $T_c$ .

CLAIM 287 (New) An apparatus comprising:

a composition including a transition metal, a group IIIB element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide comprising a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than  $26^\circ\text{K}$ ,

a temperature controller for maintaining said composition in said superconducting state at a temperature greater than  $26^\circ\text{K}$ , and

a source of an electrical current through said composition while said composition is in said superconducting state.

CLAIM 288 (New) An apparatus according to claim 287, where said transition metal is copper.

CLAIM 289 (New) An apparatus for causing electric current flow in a superconductive state at a temperature in excess of 26°K, comprising:

- (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a substantially layered perovskite crystal structure, the composition comprising a superconductor transition temperature  $T_c$  of greater than 26°K;
- b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and
- (c) a source of an electric current to flow in the superconductor element.

9 CLAIM 290 (New) An apparatus according to claim 289 in which the copper-oxide compound of the superconductive composition includes at least one element selected from the group consisting of a rare-earth element and a Group III B element and at least one alkaline-earth element.

CLAIM 291 (New) An apparatus according to claim 290 in which the rare-earth or rare-earth-like element is lanthanum.

CLAIM 292 (New) An apparatus according to claim 290 in which the alkaline-earth element is barium.

CLAIM 293 (New) An apparatus according to claim 289 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 294 (New) An apparatus according to claim 293 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 295 (New) An apparatus according to claim 294 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 296 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

g (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a rare-earth element and a Group III B element and at least one alkaline-earth element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 297 (New) An apparatus according to claim 296 in which said at least one element is lanthanum.

CLAIM 298 (New) An apparatus according to claim 296 in which the alkaline-earth element is barium.

CLAIM 299 (New) An apparatus according to claim 296 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

CLAIM 300 (New) An apparatus according to claim 299 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

CLAIM 301 (New) An apparatus according to claim 300 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

CLAIM 302 (New) An apparatus for causing electric-current flow in a superconductive state at a temperature in excess of  $26^{\circ}\text{K}$ , comprising:

g' (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a substantially layered perovskite crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than  $26^{\circ}\text{K}$ , said superconductive composition includes at least one element selected from the group consisting of a Group II A element, a rare earth element; and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above  $26^{\circ}\text{K}$  and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 303 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound



comprising a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 304 (New) An apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

9' (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a substantially layered perovskite crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 305 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

- (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound comprising a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;
- (b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and
- (c) a source of an electric current to flow in the superconductor element.

CLAIM 306 (New) An apparatus for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

- (a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal oxide compound comprising a substantially layered perovskite crystal structure, the composition comprising a superconductive transition temperature  $T_c$  of greater than 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element;

(b) a temperature controller for maintaining the superconductor element at a temperature above 26°K and below the superconductor transition  $T_c$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 307 (New) An apparatus for conducting an electric current essentially without resistive losses, comprising:

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(a) a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal-oxide compound comprising a substantially layered perovskite crystal structure, the transition metal-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element and a Group III B element, the composition comprising a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature  $T_c$  and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$ , the transition-onset temperature  $T_c$  being greater than 26°K;

(b) a temperature controller for maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature  $T_{p=0}$  of the superconductive composition; and

(c) a source of an electric current to flow in the superconductor element.

CLAIM 308 (New) An apparatus according to claim 273 wherein said composition comprises a substantially layered perovskite crystal structure.

CLAIM 309 (New) An apparatus according to claim 274 wherein said superconducting transistor metal oxide comprises a substantially layered perovskite crystal structure.

CLAIM 310 (New) An apparatus according to claim 275 wherein said superconducting copper oxide comprises a substantially layered perovskite crystal structure.

CLAIM 311 (New) An apparatus according to claim 276 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

CLAIM 312 (New) An apparatus according to claim 277 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

CLAIM 313 (New) An apparatus according to claim 278 wherein said transistor metal oxide comprises a substantially layered perovskite crystal structure.

CLAIM 314 (New) An apparatus according to claim 279 wherein said copper oxide comprises a substantially layered perovskite crystal structure.

4 CLAIM 315 (New) An apparatus according to claim 280 wherein said composition comprises a substantially layered perovskite crystal structure.

CLAIM 316 (New) An apparatus according to claim 281 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

CLAIM 317 (New) An apparatus according to claim 282 wherein said composition of matter comprises substantially layered perovskite crystal structure.

CLAIM 318 (New) An apparatus according to claim 283 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

CLAIM 319 (New) An apparatus according to claim 284 wherein said composition of matter comprises substantially layered perovskite crystal structure.

CLAIM 320 (New) An apparatus according to claim 285 wherein said transistor metal oxide comprises substantially layered perovskite crystal structure.

CLAIM 321 (New) An apparatus according to claim 286 wherein said copper oxide composition comprises substantially layered perovskite crystal structure.

